

Mechanical Integrity Program

Effective Date:	June 23, 2008
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Regulatory Purpose

The Process Safety Management Standard requires employers to develop a mechanical integrity program to assure the continued integrity of process equipment to minimize the risk of a catastrophic ammonia release. One of the goals of a mechanical integrity program should be to substitute break-down maintenance with preventative maintenance where appropriate to the equipment used in the process.

The mechanical integrity program must include the systematic identification process equipment and instrumentation, the development of written procedures for maintaining equipment, training for maintenance employees, a preventive maintenance program for process equipment, a means of assuring that deficiencies in process equipment that result in operation outside of acceptable limits are corrected, and a quality assurance program.

Regulatory Language

296-67-037

Mechanical integrity.

(1) Application. WAC 296-67-037 (2) through (6) apply to the following process equipment:

- (a) Pressure vessels and storage tanks;
- (b) Piping systems (including piping components such as valves);
- (c) Relief and vent systems and devices;
- (d) Emergency shutdown systems;
- (e) Controls (including monitoring devices and sensors, alarms, and interlocks); and
- (f) Pumps.

(2) Written procedures. The employer shall establish and implement written procedures to maintain the ongoing integrity of process equipment.

(3) Training for process maintenance activities. The employer shall train each employee involved in maintaining the ongoing integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

(4) Inspection and testing.

(a) Inspections and tests shall be performed on process equipment.

(b) Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.

(c) The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.

(d) The employer shall document each inspection and test that has been performed on process equipment. The documentation shall identify the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

(5) Equipment deficiencies. The employer shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in WAC [296-67-013](#)) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

(6) Quality assurance.

(a) In the construction of new plants and equipment, the employer shall assure that equipment as it is fabricated is suitable for the process application for which they will be used.

(b) Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.

(c) The employer shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

[Statutory Authority: Chapter [49.17](#) RCW. WSR 92-17-022 (Order 92-06), § 296-67-037, filed 8/10/92, effective 9/10/92.]

Section 1910.119(j) of the PSM Standard states:

(j) Mechanical Integrity — (1) Application. Paragraphs (j)(2) through (j)(6) of this section apply to the following process equipment:

(i) Pressure vessels and storage tanks;

(ii) Piping systems (including piping components such as valves);

(iii) Relief and vent systems and devices;

(iv) Emergency shutdown systems; (v) Controls (including monitoring devices and sensors, alarms, and interlocks) and,

(vi) Pumps

(2) Written Procedures. The employer shall establish and implement written procedures to maintain the on-going integrity of process equipment.

(3) Training for process maintenance activities. The employer shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

(4) Inspection and Testing.

(i) Inspections and tests procedures shall be performed on process equipment.

(ii) Inspection and testing shall follow recognized and generally accepted good engineering practices.

(iii) The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.

(iv) The employer shall document each inspection and test that has been performed on process equipment. The documentation shall identify the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

(5) Equipment Deficiencies. The employer shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in paragraph (d) of this section) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

(6) Quality Assurance.

(i) In the construction of new plants and equipment, the employer shall assure that equipment as it is fabricated is suitable for the process application for which they may be used.

(ii) Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.

(iii) The employer shall assure that maintenance materials, spare parts, and equipment are suitable for the process application for which they will be used.

Section 68.73 of the RMP Regulation states:

(a) Application. Paragraphs (b) through (f) of this section apply to the following process equipment:

(1) Pressure vessels and storage tanks;

(2) Piping systems (including piping components such as valves);

(3) Relief and vent systems and devices;

(4) Emergency shutdown systems;

(5) Controls (including monitoring devices and sensors, alarms, and interlocks) and,

(6) Pumps.

(b) Written procedures. The owner or operator shall establish and implement written procedures to maintain the on-going integrity of process equipment.

(c) Training for process maintenance activities. The owner or operator shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

(d) Inspection and testing.

(1) Inspections and tests shall be performed on process equipment.

(2) Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.

(3) The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.

(4) The owner or operator shall document each inspection and test that has been performed on process equipment. The documentation shall identify the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

(e) Equipment deficiencies. The owner or operator shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in § 68.65) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.

(f) Quality assurance.

(1) In the construction of new plants and equipment, the owner or operator shall assure that equipment as it is fabricated is suitable for the process application for which they will be used.

(2) Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.

(3) The owner or operator shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

References

- A.29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals, Explosives and Blasting Agents*, paragraph (j).
- B.OSHA Instruction CPL 2-2.45A CH-1, *Process Safety Management of Highly Hazardous Chemicals — Compliance Guidelines and Enforcement Procedures*, September 13, 1994.
- C.40 CFR Part 68, *Accidental Release Prevention Requirements: Risk Management Programs Under Clean Air Act* Section 112(r)(7), subpart (D), Process Safety Information (68.73).
- D.Bulletin #R1, *A Guide to Good Practices for the Operation of an Ammonia Refrigeration System*, International Institute of Ammonia Refrigeration (IIAR), 1983.
- E.Bulletin #109, *Guidelines for: Minimum Safety Criteria for a Safe Ammonia Refrigeration System*, International Institute of Ammonia Refrigeration (IIAR), 1997.
- F.Bulletin #110, *Guidelines for: Start-up, Inspection and Maintenance of Ammonia Mechanical Refrigerating Systems*, International Institute of Ammonia Refrigeration (IIAR), 1993.
- G.*Industrial Refrigeration III — Plant Maintenance & Related Subjects*, Refrigerating Engineers and Technicians Association.
- H.*Industrial Refrigeration IV — Plant Operations and Safety Subjects*, Refrigerating Engineers and Technicians Association.
- I.*Mechanical Integrity Supplement to the Maintenance Excellence Guide*, Chemical Manufacturers Association (CMA), 1994.

Procedures

An effective MI program must include:

- Written procedures to maintain the ongoing integrity of the process
- Inspecting and testing
- Correcting deficiencies in process equipment
- Training for process maintenance employees
- Quality assurance procedures

Note that the MI program must be in place before introducing ammonia into a new system.

Identification and Categorization of MI Program Equipment

All ammonia refrigeration equipment, systems and equipment which are considered critical to the safety and reliability of the ammonia refrigeration system, in that failures could cause or significantly contribute to a catastrophic release of ammonia be identified so that prevention maintenance and quality assurance programs can be developed, deficiencies controlled, and procedures and training developed. The list includes equipment that contains ammonia plus key support or utility systems. The potential consequences of the failure of key utility and support systems will be analyzed during the process hazard analysis. Such equipment shall be included in the mechanical integrity program if catastrophic releases could result from failures or deviations.

The MI program includes the following equipment:

- Pressure vessels, including ammonia storage vessels
- Piping systems, including piping components such as valves and other piping components such as heat exchangers, filters, strainers, flanges, seals, welds, gasket materials, bolts and fasteners
- Refrigeration plant relief and vent systems and devices, and relief headers
- Refrigeration plant emergency shutdown systems

- Refrigeration plant controls and instrumentation including monitoring devices and sensors, alarms, trips and interlocks
- Pumps

The following equipment shall be included in the MI program if a catastrophic release may result from failures:

- All mechanical refrigeration plant equipment containing ammonia
 - Compressors
 - Condensers
 - Evaporators
- Ammonia vapor detection systems
- Ventilation systems
- Key utility systems that interface with the covered processes, such as cooling water
- Structural components for the MI program equipment, including foundations, anchors, bolts, guy wires, and pipe supports
- Electrical distribution equipment whose failure could contribute to a catastrophic release, including circuit breakers, switchgear, voltage, current, and frequency controls, uninterruptible power supplies, emergency power generation and distribution equipment
- Fire protection equipment such as sprinklers
- Secondary containments such as dikes which would limit the spread of, or mitigate, an actual release

Individual equipment forms will be maintained for each component contained in the MI program equipment list. Equipment information containing instruction manuals, warranty records, spare parts lists, inspection and repair records, and other pertinent information will be kept in the Refrigeration Control Offices.

Inspection and testing procedures and frequencies will follow manufacturer's recommendations and good engineering practices, however a mechanical integrity audit shall be done at least every 12 months.

IOM Manuals for every system component shall be located in the Refrigeration Control Offices, which will be clearly communicated and accessible to employees.

Codes and Standards

Inspection and testing will follow recognized and generally accepted good engineering practices. Other technical work within the scope of the MI program shall follow good engineering practices.

Often, more than one good engineering practice will be applicable in a given situation. The following references may be used to determine which practice may be followed:

1. State/federal/local law or regulation
2. Industry consensus codes and standards
3. Vendor's recommendations: BAC, Colmac, Krack, Vilter, FES, Mycom, M&M, Viking; Cool-air NH₃ detectors; Honeywell NH₃ detectors
4. IIAR Bulletins: #110
5. Insurance company standards and guidance

It is understood that good engineering practices form a body of knowledge that is generally regarded as consensus guidance. In some cases, these practices may be embodied in state or local laws or regulations.

Therefore, any deviation from these practices will be studied carefully for their effect on safety, health, and the environment, for their consistency with legal requirements and whether they trigger other regulatory requirements such as MOC, PSSR, or an application for a variance (e.g., from the local mechanical or fire official).

Testing, Inspection, and Preventive Maintenance (T/I/PM) of MI Program Equipment

T/I/PM of MI program equipment is as follows:

- Apply to all recurring preventive or predictive maintenance tasks including testing, inspection, calibration, adjustment, monitoring, and lubrication.
- They do not apply to one-time-only pre-commissioning checks/tests, retests following corrective maintenance, decommissioning checks, or tests that are performed on a unique or one-time basis.
- Testing and inspecting will follow manufacturers' recommendations and good engineering practices, or the operating history (only if it requires more frequent testing and inspecting) with respect to frequency and acceptance criteria.

All inspections and tests will be documented. See example of MI forms at the end of this section. There will also be written maintenance procedures describing the methods used for performing preventive maintenance on equipment as is appropriate for a specific piece of equipment. Information in the refrigeration system is logged by the control computer system. This system records all operating parameters that need to be known to ensure that all system components are operating in the ranges determined by the system design and indicated in the Standard Operating Procedures/Technical Operations Specifications. Excursions beyond normal operating conditions will be an alarming condition in the control computer and must be resolved by the refrigeration operator. The refrigeration system is checked seven days per week by the refrigeration operator. These daily "walk-throughs" would catch any unusual vibration, noises, or other unusually conditions, and corrective actions would be scheduled. Examples of the computer logged information, and the maintenance log are included at the end of this section.

Often, more than one good engineering practice will apply to frequencies and acceptance criteria for T/I/PM tasks. In these cases, the following order of preference may be used to determine which practice should be followed:

1. State/federal/local law or regulation
2. Industry consensus codes and standards
3. Vendor's recommendations
4. IIAR Bulletins (in particular IIAR *Bulletin #110*)
5. Company equipment history
6. Industry equipment history
7. Insurance company standards and guidance

Note: Operating history will not be used as an acceptable basis to disregard a legal requirement (such as a requirement of the PSM Standard or an applicable pressure-vessel law). Some legal requirements do, however, have specific procedures for obtaining variances (permission to deviate), and these may be followed where appropriate.

The frequency and acceptable criteria for each MI task shall be determined by Refrigeration Supervisor, or other technically competent personnel by consulting the manufacturer's recommendations, applicable codes

or standards, and the equipment operating history. The frequency for a MI review of all system components shall be no greater than every 12 months, and more often if conditions warrant.

The performance of tests and inspections will be documented. The documentation will include: the name of the person who performed the inspection or test, the date, an identification of the equipment, a description of the inspection or test, and the results of the inspection or test. Typically, the maintenance employee performing the work will use a checklist describing the work to be performed and any applicable acceptance criteria. The employee will record the inspection or test results on the checklist and it is filed in the Refrigeration Control Office in the MI file.

Standard maintenance procedures shall be written for T/I/PM tasks performed on MI program equipment. These procedures, or work instructions, will be accessible and should be provided to the technician who will actually perform the tasks, will conform to the vendor's instructions as much as possible, if the vendor manuals are available. The level of detail necessary in the procedures will depend upon the complexity of the task and equipment. The work instructions shall be detailed enough to allow the tasks to be performed safely.

Test, Measurement, and Evaluation equipment used for T/I/PM work on the MI program equipment shall as appropriate, also be scheduled for preventive maintenance.

Electrical equipment has annual infrared testing done by an outside contractor with a findings report generated after completion. All electrical distribution equipment is checked during this inspection. Fire protection equipment, both portable and fixed, is tested annually for proper operation and deficiencies are corrected immediately. Alarm systems and monitoring stations are tested as well as hydrant flow. These are tested and maintained by outside contractors specializing in this field, or in the case of hydrant flow the fire dept. conducts these tests.

Controlling Deficiencies

A deviation outside of acceptable limits as defined by the Process Safety Information must either be corrected before further use of the equipment or alternative protective measures to assure safe operation of equipment must be taken. The *acceptable limits* of equipment include the operating limits of process equipment and the acceptance criteria used for preventive maintenance. Often times, it may be necessary to implement temporary safeguards in order to protect the safety and health of onsite and offsite personnel.

Examples of potential deviations from acceptable limits include:

- Deviations from equipment requirements discovered during testing, inspection, or preventive maintenance (T/I/PM) tasks.
- Process deviations discovered during operations (e.g., process parameter operating out-of-range).

The following sections describe the procedures, which shall be followed if deficiencies are discovered. Deficiencies on MI program equipment discovered during T/I/PM tasks may be resolved as follows:

1. Any device that can be returned to its specified conditions should be adjusted during the performance of the T/I/PM task. Such adjustments may be part of the allowable actions in the work instructions for the task.
2. If the equipment cannot be returned to its specified conditions during the T/I/PM task, then following actions will be performed:
 - a. Shut down the equipment immediately if the deficiency cannot be corrected, or
 - b. Implement alternative measures to assure safe operation of the equipment. If these measures involve equipment or operating procedure changes, follow the Management of Change procedure where applicable.

Deficiencies on MI program equipment discovered during operations will be resolved as follows:

1. Any device that can be returned to its specified conditions shall be adjusted during normal operations. Such adjustments shall be part of the allowable actions in the standard operating procedures (SOPs) for the process or unit.
2. If the equipment cannot be returned to an in-specification condition as part of the normal operating steps, then the following actions must be performed:
 - a. Shut down the equipment immediately if the deficiency cannot be corrected, or
 - b. Implement alternative measures to assure safe operation of the equipment. If these measures involve equipment or operating procedure changes, follow the Management of Change procedure where applicable.

When a deficiency is discovered and documented in the testing and inspection results, a record describing the measures taken to correct the deficiency may be placed in the equipment file, or MI file. The record may include:

- How and when a deficiency was identified.
- What will be done to correct the deficiency and the rationale for the decision.
- When the correction will be completed.
- What other plant operational actions were taken, if necessary, when the deficiencies were actually corrected.

Training Procedures

Maintenance employees must receive an overview of the ammonia refrigeration process as well as training concerning the maintenance procedures. The materials used for the training may also include:

- Preventive maintenance schedules.
- Inspection and testing forms.
- Computer system logging.
- The means of maintaining equipment files.

Quality Assurance Procedures

The MI program shall include procedures for assuring quality in the construction of new facilities and installation of equipment. The procedures shall provide for checks and inspections to assure that equipment is installed properly and pursuant to the manufacturer's recommendations and is consistent with design specifications. In addition, the program shall include a means of assuring that maintenance materials and spare parts are suitable for their intended use.

To implement this quality assurance procedure the following system shall be used.

Engineering, Design, and Fabrication of MI Program Equipment

The PSM Standard requires that the quality assurance procedures apply to the construction of facilities and equipment. Legacy Fruit Packers, LLC. Shall assure that equipment as it is fabricated is suitable for the process application for which they will be used. These requirements may apply to engineering and design activities on equipment included in the MI program. They address the following activities:

- Design activities for new or modified equipment.
- Purchasing of new or modified equipment.
- Fabrication of equipment.

This procedure may apply to the following types of projects:

- Any change to MI program equipment, which is not defined in the MOC program as *Replacement-In-Kind*.
- New MI program equipment, which must be engineered. For the purposes of the PSM program, new processes are those, which are independent from and not connected to existing processes.
- Reverse engineering of processes with used equipment, or for equipment where process safety information is missing and must be restored.
- Process control software changes.

Each engineering project on MI program equipment may trigger PSM requirements such as MOC and PSSR, as well as internal procedures for capital expenditures. The choice of which procedure applies may be made by the Refrigeration Lead Technician, or other corporate personnel based on the size and scope of the project.

Engineering work shall follow good engineering practices applicable to ammonia refrigeration plants and its support and utility systems. Typical good engineering practices for ammonia refrigeration plants are discussed in Codes and Standards. If the engineering work is not performed using standard references, or is performed from references never used before, the references may be approved by agreement between the designing contractor and Legacy Fruit Packers, LLC.. If the engineering project involves used equipment, the following activities may be performed:

- The equipment history for the used equipment may be obtained, if available.
- The used equipment may be physically inspected to help determine its fitness for service in the new application.
- The used equipment may be subjected to appropriate engineering analysis to ensure that its original design basis will accommodate the anticipated service conditions of the new application including abnormal, upset, or emergency conditions.
- If possible, the used equipment may be tested prior to installation to confirm the engineering analysis and replicate the service conditions of the new application. The decision to perform testing may be made by Legacy Fruit Packers, LLC.. Additionally, any tests required to restart the system where the used equipment has been installed may be performed as explained in the Pre-commissioning section of this Guideline.

All engineering work shall be performed by individuals or companies qualified to do so. Stamps or approvals by registered professional engineers shall be obtained where required in accordance with applicable state laws.

All engineering work should be approved internally **before equipment is purchased**. For complex or new facilities, the MI program may require two reviews — one during the preliminary stage, and one when the

detailed engineering work is at or near completion. The approval process may consist of assigned individuals independently reviewing the design. These persons can either be plant employees, corporate employees, consultants or installing contractor. Alternatively, design review meetings may be held where the persons performing the design work essentially present their work to a group of knowledgeable persons representing the company. The reviews may be maintained and responses to any action items documented in the Project File. Typically, the documentation will consist of written comments or meeting minutes submitted to the Refrigeration Lead Technician, or other designated individual.

The final approval of designs should be written and issued by the P/S/R Manager, upper Management, or other designated individual.

To ensure that the materials purchased meet design specifications and are otherwise suitable, the Refrigeration Supervisor or other appropriate personnel must receive pertinent information about the materials being purchased. When the change will involve the purchasing of new or used material, the Refrigeration Supervisor or other appropriate personnel may be provided with the vendor's part or catalog number(s). If the material is unique, not standard vendor material, or cannot be completely described using a part number, then the following information may be provided to the Refrigeration Supervisor or other appropriate personnel so that the correct material is purchased:

- Description of the intended use
- Engineering drawing or sketch of the part or equipment
- Code or standard governing the material's design or operation
- Expected process design and operating conditions of pressure, temperature, flow, and any other relevant parameters
- NFPA electrical classification
- Expected ambient environmental conditions where the material will be located
- Desired failure condition of the component on loss of applicable services (power, air, etc.)
- Expected corrosion/erosion environment
- Written operating and maintenance instructions desired from the vendor
- Test certifications desired from the vendor
- For used equipment, the maintenance history desired from the vendor.

Appropriate personnel shall ascertain which support documents the vendor needs to supply with the equipment or components and attach a list to the request for bid or the purchase order.

Some engineering work will trigger application of other parts of the PSM program. At a minimum, the process safety information (PSI) shall change for each project because additional information will be added. Equipment files shall be established for new or modified equipment in the MI program that include, as appropriate, erection/fabrication drawings, certification forms for coded vessels and other equipment, materials of construction lists, and welding specifications.

The MOC, PSSR, and/or engineering procedures shall include the following:

- Fabrication must be conducted in accordance with applicable good engineering practices.
- New equipment must be physically inspected by purchasing, engineering, the contractor, or the maintenance inspection staff at its manufacture, repair, or alteration site, as designated by the Refrigeration Lead Technician, or other appropriate personnel.
- Equipment inspections must be conducted by purchasing, engineering, the contractor, or

maintenance when the equipment is delivered to the site.

- The equipment must be properly stored following receipt to preserve its integrity while awaiting installation. Storage of material awaiting installation must follow the manufacturer's instructions, particularly when the material will be stored outdoors. Directions for protection from the elements, sealing, lubrication, rigging and support, or any other periodic preventive maintenance task must be followed. Indoor storage must take into account environmental conditions (temperature and humidity) as well as shelf life.
- All equipment shall be logged as received once the equipment arrives at the site.
- All fabrication-related inspections may be documented and become part of the equipment files.

Installation of MI Program Equipment

Appropriate checks and inspections shall be performed to assure that equipment covered under the MI program is installed properly and consistent with the design specifications and the manufacturer's instructions. The installation of MI program equipment:

- Follows applicable good engineering practices; and,
- Shall be performed pursuant to the manufacturer's instructions and any additional requirements set out in the MOC documents or the work order.

The preparation of the installation work site includes: obtaining all required federal, state, and local building and environmental permits. The installation work shall be performed using the applicable safe work procedures, such as lockout/tagout and confined space entry, developed by the facility.

All ammonia refrigeration systems shall be installed under the supervision of persons who, by reason of knowledge, training and experience, are competent for the tasks. Such persons may include one or a combination of the following:

- Experienced refrigeration contractors, possibly in combination with an engineering code authority, authorized inspection agency or property insurance underwriter
- In-house design/engineering staff
- Consulting engineers, acting on behalf of the company
- Refrigeration equipment supplier
- Other qualified personnel

It is Legacy Fruit Packers, LLC. responsibility to ensure that the contractors responsible for the construction of the ammonia refrigerating systems are qualified for their relevant responsibilities as outlined in the Contractor Section of the PSM program.

The MI program and/or PSSR procedure require checks and inspections to assure that equipment is properly installed. These inspections may include:

- Inspections conducted at periodic intervals, after the completion of key milestones, or at the end of the job.
- May include hand-written notes or field journals of installation activities, problems, problem resolution, installation contractor progress, contractor safety performance, and any other useful information.

Pre-commissioning and Start-Up Safety Review of MI Program Equipment

The general requirements for commissioning and start-up safety review activities are as follows:

- These requirements apply to start-up activities for new MI program equipment as well as modifications to existing MI program equipment without regard to size, monetary value, or approval authority of the change.
- Prior to the initial start-up of new or modified MI program equipment, the following checklists may be completed and approved:
- Pre-commissioning Checklist: covers hardware-related items.
- Pre-start-up Safety Review Checklist: covers issues required by 29 CFR 1910.119 (i) and see the Pre-Startup Safety Review in the Legacy Fruit Packers, LLC.. PSM program.

Each item on both checklists may be completed and signed-off, or “Not Required” entered with a signature for each item. Checklist items should not be left blank.

Where checklist items require tests or analysis, the supporting documentation for the completion of this work shall be attached to the appropriate checklist.

Quality Assurance of Materials and Spare Parts for MI Program Equipment

The Legacy Fruit Packers, LLC. shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

The procedure below is suitable for routine inventory replacement and management. It is not appropriate for one-time buys of material to support an engineering project; another procedure should be used for quality assurance.

Routine inventory replacement material and spare parts may be ordered for new equipment based on vendor recommendations, an analysis of the operating history of the equipment, or previous experience with similar material in a given application.

The buyer of routine inventory replacement material or spare parts shall be provided with the vendor’s part or catalog number. Refer to Engineering, Design, and Fabrication of MI Program Equipment if the material is no longer listed in a vendor’s catalog or if the part number cannot be determined.

If the material or its enclosed documents do not match the purchase order, Legacy Fruit Packers, LLC. shall advise the Vendor immediately of the discrepancy. Material, which is, or is suspected to be faulty, should immediately be segregated in the warehouse in a clearly marked and designated storage location so it is not inadvertently used. In this case, the vendor should be contacted as soon as possible to determine how to return the faulty material. The shipping documents should also be segregated so that they may be sent with the returned equipment.

For maintenance materials, spare parts and equipment which contractors purchase and/or install into a process, the employer must still ensure that they are suitable for their intended use.

The spare parts storage area(s) should provide a storage environment (temperature, humidity, dust level, etc.) that is appropriate for the materials stored. If the incoming material has a shelf life, it should be clearly marked to prevent it being inadvertently issued after the shelf life has expired.

Decommissioning of MI Program Equipment

The decommissioning of a process is considered a change and must be accomplished using the MOC procedure. The MOC procedure must ensure that the steps to decommission the process or equipment have been performed and that any recommendations identified have been resolved.

In order to be considered decommissioned the following minimum requirements should be met:

- The decommissioned process or equipment has been isolated from the remainder of the plant by disconnecting lines or by the use of physical blanks. The closure of valves is **not** considered adequate isolation.
- The highly hazardous materials in the decommissioned process equipment have been removed (de-inventoried), and steps necessary to remove residual amounts of these materials have been taken.

The Decommissioning Checklist shown in Attachment MI-2 shall be completed before the process or equipment is considered decommissioned. Each item on the Decommissioning Checklist shall be completed and signed-off, or “Not Required” entered with a signature for each item. Checklist items should not be left blank.

Where checklist items require tests, analysis, or documentation, the supporting documentation for this work should be attached to the checklist. For example, a list indicating how/where the equipment was physically isolated from the remainder of the plant may be attached to the decommissioning checklist.

When a system or equipment has been idled but has not been dismantled, the planned T/I/PM task frequencies may be reduced or suspended as determined by Refrigeration Lead Technician, or other appropriate personnel. The process safety information, operating procedures, and maintenance procedures shall be maintained in the PSM files.

When a system or equipment has been dismantled, the planned T/I/PM task frequencies shall be suspended, and the process safety information, operating procedures, and maintenance procedures disposed of as desired.

Personnel

The following section lists the personnel or departments that may be involved with the MI program and suggests the responsibilities that may be assigned to them.

Refrigeration Lead Technician

- Identify and list the systems and equipment, which are critical to the safety and reliability of the ammonia system.
- Ensure that individual equipment files are maintained for each component contained in the MI program equipment list.
- Identify the good engineering practices, which apply to the ammonia system.
- Ensure that inspection and testing of MI program equipment is planned, scheduled, recorded, and managed according to good engineering practices.
- Establish and implement procedures to ensure that deficiencies are dealt with in a timely and a technically sound manner.
- Establish and implement quality assurance procedures for the mechanical integrity activities.
- Work with the other divisions to ensure that good engineering practices are followed to purchase new and used equipment for the ammonia system.
- Determine which support documents that vendors need to supply with new or used equipment and

ensure that these documents are provided.

- Participate in fabrication-related inspections (fabrication site, receipt, and storage) as required.
- Draft and review written procedures for maintaining the ongoing integrity of the system.
- Develop and periodically review the training program for those employees who maintain the MI program equipment.

Refrigeration Operators

- Participate in the development of the mechanical integrity program and procedures.
- Participate in Mechanical Integrity Audits conducted on the ammonia system.

Examples of Temporary Limits and Additional Protective Features

Administrative Controls/Temporary Limits

- Revise operating limits (pressures, temperatures, etc.) to be more restrictive
- Reduce process throughput
- Increase monitoring of equipment and provide appropriate communications to react to upsets
- Restrict personnel access to area

Mechanical/Electrical Protection

- Add additional interlocks and/or connect to an emergency shutdown device
- Reduce trip, alarm, and interlock set points
- Decrease pressure safety valve set points
- Provide backup power supplies

Increased Monitoring and Inspections

- Measure wall thickness or discovered crack more frequently with non-destructive testing (NDT)
- Perform vibration monitoring more frequently

Temporary Repair

- Additional pipe supports for piping with reduced wall thickness
- May need to use combination of the above controls

Attachment MI-1

Pre-commissioning Checklist

Plant Area		Process	
Installation:	Physical Inspection Complete:	Date:	Signature:
	Comments:		
	Adheres to Codes and Standards:	Date:	Signature:
	(List codes & standards on separate sheet) Comments:		
	Adheres to Local Pipe Spec:	Date:	Signature:
	Comments:		
Fill & Leak Test:		Date:	Signature:
Comments:			
Pressure Test:		Date:	Signature:
Comments:			
Insulation Resistance:		Date:	Signature:
Comments:			
Ground System Check:		Date:	Signature:
Comments:			
Rotation Check:		Date:	Signature:
Comments:			

Operational Test:		<i>Date:</i>	<i>Signature:</i>
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Comments:

Alarm, Interlock, & Trip Test:		<i>Date:</i>	<i>Signature:</i>
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Comments:

Vibration Acceptance:		<i>Date:</i>	<i>Signature:</i>
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Comments:

The items contained on this checklist have been completed and authorization is given to startup the new or modified MI program equipment.

Date:	Authorizing Signature:
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Attachment MI-2

Decommissioning Checklist

Plant Area	Process/Equipment
Type of Decommissioning: <input type="checkbox"/> Idled but not dismantled <input type="checkbox"/> Dismantled	
PHA Completed and Recommendations Resolved (if required):	
Date:	Signature:
Comments:	
Process/Equipment De-inventoried:	
Date:	Signature:
Comments:	
Process/Equipment Blanked (with completed blank list attached):	
Date:	Signature:
Comments:	
Testing, Inspection, and Preventative Maintenance Schedules Modified:	
Date:	Signature:
Comments:	
Production Operator Training Program Revised:	
Date:	Signature:
Comments:	
PSI, Operating, Maintenance Procedures, & Equipment History Records Archived (if required):	
Date:	Signature:
Comments:	
The items contained on this checklist have been completed and authorization is given to decommission the MI program equipment.	
Date:	Authorizing Signature:

Computer Log Example

Maintenance Log Example